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In the December NATURALIST (page 773), there is another paper by Prof. Cope on the "Proboscidiæ of the American Eocene." The discoveries here claimed rest on an equally unsatisfactory basis. The species mentioned had apparently all or nearly all been previously described by Dr. Leidy and myself, the type species, *Tinoceras anceps* Marsh, dating back to June, 1871. Some of the characters given by Prof. Cope, *e.g.*, the large upper incisors and absence of canines, do not, indeed, apply to the species I have described; but I feel quite sure that Prof. Cope's haste has unfortunately led him to mistake canines for incisors. On several other points, especially the position of the horns and structure of the skull, I believe Prof. Cope to be equally wrong. The animals described evidently belong to the order which I have called *Dinocerea* (Amer. Journ. Sci., Oct. 1872, p. 344). Their true characters and affinities, I propose soon to discuss fully elsewhere. — O. C. MARSH.

DISCOVERY OF EXTINCT MAMMALS IN THE VICTORIA CAVES, SETTLE, YORKSHIRE. — This famous bone-cave has hitherto produced only remains of different ages from the Neolithic period to the present. Recent excavations have yielded, however, at the depth of about twenty feet, bones of the elephant, rhinoceros, hyena, a crushed canine of a much larger carnivore, etc. The elephant's teeth found belong to a young individual, and the number of gnawed bones and other indications, that the cave had been a den of some larger carnivores, render it probable that the elephant was dragged into it by them. — A. W. B.

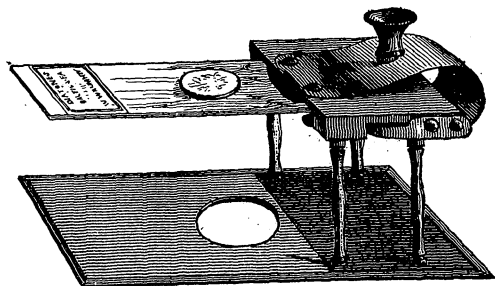
MICROSCOPY.

MICROSCOPY AT THE VIENNA EXPOSITION. — The Exposition of the Industry of all nations to be held in Vienna this year, will afford microscopists a rare opportunity to exhibit to the world the results of their ingenuity in contrivance, or of their skill in construction, of microscopical apparatus and appliances. General T. B. Van Buren is Commissioner General for the United States, and President F. A. P. Barnard is chairman of the Advisory Committee on Group XIV, in which are included optical instruments. Persons desirous of contributing to the exhibition of American art on this occasion are requested to communicate immediately with any of the following persons who are the microscopical

members of the committee; Profs. R. H. Ward, M.D. of Troy, New York, H. L. Smith of Hobart College, Messrs R. B. Tolles of Boston, Mass., W. S. Sullivant of Columbus, Ohio, J. B. Rich of New York City, William Wales of Fort Lee, New Jersey, Charles A. Spencer of Canastota, New York, Joseph Zentmayer of Philadelphia, Pennsylvania, and J. Grunow of New York City.

A NEW ACCESSORY STAGE.—Messrs. James W. Queen & Co., of Chestnut Street, Philadelphia, and Broadway, New York, have contrived a stage which can be used with any microscope and which will commend itself to many microscopists as a very useful accessory. It consists of a brass stage-plate, perforated in the centre for the transmission of light and bearing, at one end, four pillars which support, at the height of about an inch, a second plate. To the under side of this second plate the object-slide is attached by

Fig. 6.



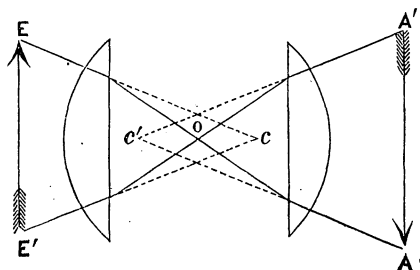
means of slight springs which allow it to be easily misplaced. It is evident that this contrivance admits of any degree of obliquity of illumination without regard to the construction of the stand on which it is used; and the slight awkwardness of adapting an achromatic condenser to this apparatus is nearly negated by the fact that most microscopists prefer to obtain extremely oblique illumination either by a prism, or directly (unmodified) from the source of light, for both of which this arrangement is especially available. The comparative safety of the thin glass cover over the object will also be appreciated by the many persons who have seen a rare or costly object, such as the Type Plate, or Nobeit's Lines, ruined by an incautious touch of a high power objective.

MAGNIFYING POWER OF OBJECTIVES. *To the Editors of the AMERICAN NATURALIST.* DEAR SIR:—With great interest and pleasure I have followed the preliminary movements to establish a

uniform nomenclature of the value of achromatic objectives for the microscope, to which the foremost microscopists of our country and abroad have advanced their contributions.

The problem is a complicated one, and the following will by no

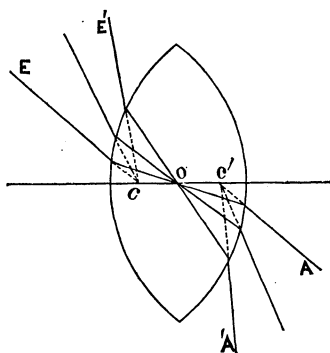
Fig. 7.



means diminish the practical difficulties, but will only add one more which has not been brought into consideration.

Undue importance is given to the optical centre of a lens, or combination of lenses, by the different writers upon the subject,

Fig. 8.



while the great importance of the conjugate centres of a lens has been entirely neglected. The conjugate foci of a lens or combination of lenses, are in no way dependent on its optical centre, but entirely on the conjugate centres. The single plano-convex lens makes an exception: for in this the optical centre and the conjugate centres fall together, where the optical axis meets the curved surface.

If we take, for instance, a double convex lens of equal radii, Fig. 7, its optical centre is O , and consequently the rays A' and A , striking the lens at such angles as to pass through the optical centre, will emerge at E' and E , parallel with the first directions. If now the rays A' and A are prolonged towards the optical axis

of the lens, they meet at a point, C' , the centre of admission. If the rays E' and E are prolonged, they will meet at C , the centre of emission. Therefore the conjugate foci do not meet at the optical centre O , but are to be measured from C' to the object, and from C to the image; and the sum of the conjugate foci is *not* equal to the distance between object and image, but in this case the distance between C and C' must be deducted.

In combinations of lenses it is precisely the same. It is almost impossible to analyze such a complicated system as a modern microscopical objective, and to fix the position of the optical centre or the conjugate centres, although all combinations possess these remarkable centres. But let us take a simple combination of two plano-convex lenses placed symmetrically, in which it is not difficult to determine all that we need. In such a combination, Fig. 8, the rays A and A' pass through the optical centre O , and emerge to E and E' , parallel with their original directions. Now if we prolong A and A' , they will meet at C' , the centre of admission; and E and E' prolonged will meet at C , the centre of emission. To find for this combination the relation of conjugate foci, or the relation between the size of object and image, we have to compare the triangle ECE' , with the triangle $A'C'A$. In this case the sum of the conjugate foci is equal to the distance of object and image, plus the distance from C' to C . In combinations this will generally be the case. — JOSEPH ZENTMAYER, *Philadelphia, Sept. 25th, 1872.*

AMPHIPLEURA PELLUCIDA BY MOONLIGHT. — Many microscopists have had the curiosity to use the beautiful white light of the full moon as a source of microscopical illumination, but probably few have tried it upon the more difficult objects. Prof. T. D. Biscoe, led on by the clear sharp view given by it of easier objects, tested it upon the last diatom of the Test Plate, using a Hartnack objective No. 10, and resolved the "test" at first trial.

THE STUDY OF LICHENS.—The explanation of the peculiar double nature of the lichens has lately become the subject of much discussion. It has been long recognized that in the tissue of lichens; are to be found two quite distinct classes of elements. By one class the lichens are allied with the fungi, by the other with the algæ. The great body of a lichen is made up of a structure exactly identical with certain fungi, while scattered through the

substance are green granules or cells called gonidia; these bear a strong resemblance to certain kinds of algæ.

The same double nature of the lichens is evinced in their fructification, even more strikingly than in the simple vegetative system. The complete identity of fruit (apothecia and spermagona) produced by hyphen threads of lichens with fruit of the division Ascomycetæ of the fungi has been well known, and has even led to the classification of this division of fungi with the lichens (by Schleiden in 1842). But what astonishment was created when, in 1867, Famentzin and Baranetzky showed that the gonidia also, in favorable circumstances, produced fruit identical with the zoospores of algæ.

The question presses home more and more, whether the lichen is a single individual whose development follows these two divergent paths, or whether two distinct individuals out of different natural classes have combined together to live a united life.

On the former supposition, the complete agreement of the gonidia of lichens with certain algæ, and the fact that gonidia freed from the lichen threads in which they lie embedded possess the power of independent life and development (in which state they cannot be distinguished from algæ): these two considerations have led to the almost inevitable conclusion that numerous genera of algæ (as supposed) are undeveloped or, it may be, abnormal states of lichens. Famentzin and Baranetzky have lately adopted this theory. On the other hand, De Bary (1866) has pointed out the possibility that in the case of the "jelly-lichens" (Gallertflechten) the gonidia may be real algæ which have assumed the form of lichens because parasitic fungi (of the family Ascomycetæ) have united themselves with them.

Since 1867 Schwendener has extended this theory over the whole class of lichens. According to him lichens consist of algæ spun over, and swallowed up, as it were, in the meshes of the mycelia of certain fungi. There seemed one thing only needed to establish this theory, namely, to succeed in raising lichens by sowing the spores of fungi on gonidian-like algæ. This experiment has been successfully carried through in the case of a given species of the genus *Collema*, by Dr. Beess in 1871.

Although this would seem to close the case, yet the new view is not accepted by the most experienced lichenologists. They hold the view of the single nature of the lichen, saying that the

resemblance of gonidia to algæ does not prove identity, that they have microscopically demonstrated the genetic connection of the gonidia with the hyphen threads of that lichen, and that Tulasne has raised lichens from lichen spores, without the presence of any algæ; hence the Berlin Academy has announced the following Prize-question: "The proving of Schwendener's view of the double nature of the lichen," by means of original investigations. And they recommend the study of the following points.

1st. An exact study of the numerous one-celled forms of algæ which so closely resemble the gonidia of lichens. These are now classed in the genera *Pleurococcus*, *Cystococcus*, *Glococystis*, etc.

2nd. Continuous investigation on the gonidia contained in the thallus of lichens, especially with regard to their development after being freed from the lichen thallus for the purpose of ascertaining with more certainty the different types of algæ that appear. The question whether among the great number of green gonidia, inhabiting lichens, there may not be more numerous types than has been supposed, taken in connection with the investigations suggested above on the free living forms of algæ ought be kept clearly in mind. The case of the occurrence of different forms of gonidia in one and the same lichen deserves special attention.

3d. The carrying on of repeated "culture-from-spore" experiments with lichens from different families with and without the presence of the algæ that are supposed to be the nourishing plants. This should be especially done with lichens containing chlorophyl-green gonidia.

The work may be presented in German, Latin, French, English or Italian. Important points of investigation must be illustrated by drawings, and the presentation of preparations (microscopic) is advisable.

The time for sending in the papers is fixed at the first of March, 1875. Real names are to be sent in sealed envelopes. The prize is one hundred ducats.—T. D. B.

MISNAMING OBJECTIVES.—[Mr. Wenham has made public the following brief reply to Mr. Stodder's communication on this subject in the August number of the *NATURALIST*. This controversy, having already called sufficient attention to the points at issue, would be fruitless if still further prolonged.] I should

not have taken time to notice the long comment on my short letter, appearing on page 234 of the "Monthly Microscopical Journal" for May, 1872, but for the remark that my letter was written with "evident loss of temper!" Quite the reverse; it was penned in a spirit of "chaff," and Mr. Bicknell, in his brief note in reply, seems to have caught the vein; at which no one, perhaps, laughed more heartily than myself. On the other hand, it has drawn C. S. out of his shell, with horns erect, in his proper name or color. I have nothing further to say on the question, which leads to no scientific discovery, and is one to be settled between the makers of object-glasses and purchasers, who are now sufficiently warned. No particular reform can be anticipated by pages of controversy having for its very basis such full scope for personalities, of which this and the above may be taken as a sample. The tone is becoming silly and tiresome; and having contributed my share, I must drop the subject with the remark that no one would be more willing to induce the makers to adopt a nomenclature having a definite reference to actual magnifying power than myself, could I see the possibility of doing so. Numerals such as those adopted by the Continental makers would perhaps partly meet the difficulty; but I believe that no English optician would consent to name his glasses this way.—F. H. WENHAM.

NEW YORK UNICINULÆ.—Mr. Charles H. Peck has communicated to the Albany Institute a synopsis of the New York (State) Uncinulæ, described seven species as occurring in the state in addition to two described by Dr. E. C. Howe. Only three species are credited to Great Britain, whose mycology has been well investigated. Our species are systematized as follows.

Appendages to the conceptacles thirty or more.

Sporangia with eight spores,.....	<i>U. circinata.</i>
Sporangia with six spores,.....	<i>U. parvula.</i>
Sporangia with four spores,.....	<i>U. adunca.</i>
Sporangia with two spores,.....	<i>U. macrospora.</i>

Appendages less than thirty.

Appendages white, flexuous toward the tips,...	<i>U. flexuosa.</i>
Appendages white, not flexuous,.....	<i>U. Clintonii.</i>
Appendages colored,.....	<i>U. ampelopsidis.</i>

Dr. Howe's species are *U. Americana* (*U. spiralis* B. & C.) figured but not described by Berkeley, which is near *U. ampelopsidis* but has appendages few, longer and colored; and *U. luculenta* which is

much like *adunca*, but has fewer and longer appendages and sometimes sporangia with five or six spores.

STAINING VEGETABLE TISSUES. — L. Ereckmann explains, in the "Journal of the Franklin Institute," that the staining of plant sections with a weak solution of aniline red, and then washing out with water the color from all the non-nitrogenous parts, is not only useful for purposes of general study, but is especially applicable in the preparation of specimens for photographic use.

NOTES.

A semiannual session of the National Academy of Science was held at Cambridge, November 21st, 22d, 23d, in the lecture room of the Museum of Comparative Zoology, where Professor Agassiz welcomed the members, and gave an account of the rise and present condition of the museum. Of the twenty-eight papers read there were presented thirteen relating to geology and zoology, with the following titles:—

The Organization of the Museum of Comp. Zoology in Cambridge, by L. AGASSIZ.

On three different Modes of Teething among Selachians, by L. AGASSIZ.

The Development of Actiniæ, by ALEX. AGASSIZ.

The glacial Phenomena of the southern Hemisphere compared with those of the North, by L. AGASSIZ.

Affinities of Echinoderms and Worms, by A. AGASSIZ.

Notice of Investigations making in California on the Reliability of the Barometer as a hypsometric Instrument, by J. D. WHITNEY.

Pedicellariæ of Echinoderms, by A. AGASSIZ.

Results of recent Dredgings on the coast of New England, by A. E. VERRILL.

Embryological Fragments concerning the Volutidæ, by L. AGASSIZ.

On the specific Identity of some Animals along the Atlantic and Pacific shores of America, by L. AGASSIZ.

The copulatory Organs of the Selachians compared with one another, and with those of other Vertebrates, by L. AGASSIZ.

On the changes Selachians undergo with age, by L. AGASSIZ.

Critical remarks about scientific views entertained upon theoretical grounds, by L. AGASSIZ.

Notice of the progress of the topographical work of the Geological Survey of California, by J. D. WHITNEY.

Professor Agassiz read a paper on "Three Different Modes of Teething among Selachians." He said that in former years he had paid considerable attention to the peculiarities of teeth among the Selachians, but the progress of zoology and palæontology made the present materials on hand quite insufficient. It was not known what changes took place with age. So he had determined upon